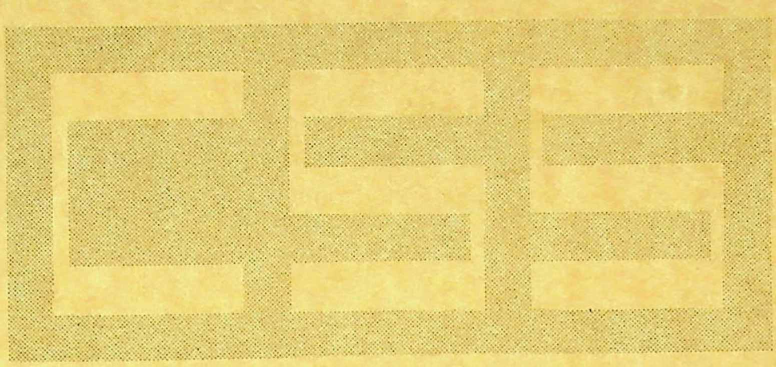

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XREF

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XREF

A CROSS REFERENCE TABLE GENERATOR FOR M6800 PROGRAMS

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INTRODUCTION

XREF is a program for the M6800 that reads an assembly language source file and creates from it a table of all symbolic references encountered in the source file. The table produced is sorted in alphanumeric order by symbol name. Each symbol name is associated with the number of the line in which it is defined, as well as the number(s) of the lines where it is referenced (used as an operand).

XREF is serially reusable pure code; the program would normally be executed from RAM, but it may be placed in ROM if so desired. The program maintains a stack pointer at all times; it is therefore fully interruptible and compatible with multitasking. The program has been written with easy modification in mind. By changing a few pointers, the buffers, the table area, and the I/O routines can be placed at any address.

System requirements for execution of XREF are: An M6800 processor with at least 5K bytes of RAM (8K minimum recommended), a set of system I/O routines (usually those in MIKBUG®), a terminal, a file input device, and an output list device (which could be the terminal). The program size is approximately 4K bytes; each symbol from the source file requires 10 bytes of RAM, plus 2 more bytes for each reference to the symbol. A medium length program might have 250 symbols and would require approximately 4K of table space (250*10+250*3*2 = 4000).

OPERATING INSTRUCTIONS

XREF supports both disk CO-RES source files and disk SSB/TSC Editor files. The format for using XREF is as follows:

```
XREF, FILE NAME, S or P, C or blank
S = Serial printer (port 3)   P = Parallel printer (port 6)
                   C = CO-RES file
```

The defaults are the parallel port and Editor file - if this is what you are using, you need only type: XREF,FILE NAME.

XREF will read the input file, creating the cross reference table as it reads. At the completion of reading, the READ COMPLETE message will be displayed on the terminal, and the program will begin to output the table to the listing device. When the table is printed, XREF returns control to DOS. If the program must be stopped during the printing phase (to clear a paper jam, for example) the listing may be restarted by jumping to location $0103.

LIMITATIONS

XREF will read line numbers from the input file, or will generate its own, depending upon the user option selected. In either case, line numbers must greater than 0 and less than 65024.

XREF will ignore symbol names that are identical to opcode mnemonics.

The source file alpha characters must be all uppercase in the symbol names and opcode mnemonics; lower case is OK in comments.

XREF uses a portion of page 0 for flags, pointers, constants, etc. It also operates some temporary buffers in this area; therefore, page 0 must be read/write memory.

The buffers starting at TBUFZ, LBUFZ, RFCB, and BEGT must be in read/write memory, although not necessarily in contiguous RAM.

HOW IT WORKS

XREF reads a source file in much the same way as an assembler would; character strings are copied into a line buffer and are processed when each line is terminated (by a carriage return character). When a complete line is available, it is checked to see if it is a comment line. If so, it is ignored and the next line is obtained. Otherwise, the line is processed by parsing for tokens. When a token is found, it is compared against entries already in the symbol table. If the token is already in the table, the line number is included in the table. If it is not in the symbol table, it is checked against the opcode table. If it is an opcode, the symbol is ignored but the opcode type is checked to see if any operands are utilized. If not, the next line of input is obtained. If operands are required, the program parses the next field for symbol names and adds any that it finds to the table.

If the token found does not appear in either the symbol table or the opcode table, it is assumed to be a new symbol and a new table entry is created for it.

The process of reading and processing lines from the input file continues until an end-of-file character is found.
At this time, reading is terminated and the table is printed out.

The process of entering a symbol into the table consists of finding the correct location for it, moving up all entries past that point, and then inserting the new symbol into the space created by the move. The same procedure is followed when adding a reference to an existing symbol. Thus, the table is sorted as it is built. The structure of the table is: The first 6 bytes are the ASCII values of the characters in the symbol name; the next 2 bytes are the binary value of the number of the line where the symbol was defined; the next 2 bytes (and succeeding byte pairs) are the binary value of the numbers of the line(s) where the symbol is referenced; the next two bytes have a value of FFFF (this is an 'end of entry' marker). If no references to the symbol exist, then the FFFF byte pair immediately follows the definition byte pair. If the symbol is not defined, the definition byte pair has a value of 0 and will not be printed (this will cause an assembler error when you try to assemble the source file!) The entry for the next symbol name begins immediately after the FFFF byte pair. See Figure 1 for an example of the table structure.

If, in the process of adding an entry to the symbol table, the XREF program runs out of room in memory it will enter a recovery mode. The recovery mode causes a current printout of the symbol table to occur, followed by the deletion of all references to defined symbols. If this creates at least 40 bytes more table space, the program will resume where it left off, and continue until either an EOF is read from the input file, or the table is full again. When the table is full, the same procedure of printing the current table (which will not contain the old references this time) and deleting references occurs. If memory overflow continues to occur, you may get as many as several tables printed for each line of input. The only cure for this problem is more memory in your system.

If the purging of the defined symbol references does not free at least 40 bytes of memory, then the program gives up, prints a TABLE FULL message, and returns control to the monitor.

The process of printing the cross reference table consists of printing 6 ASCII characters from the table (the symbol name), followed by a 5 digit decimal line number (its definition line), followed by as many 5 digit decimal line numbers as are required for the references found. When a byte pair of value FFFF is encountered, the printing for this symbol is terminated, and the next print line is started with the next symbol name. The end of the table is recognized when the next symbol's name is found to start with a null (the table was cleared to 0s upon initialization).

XREF supports the Motorola standard assembler format, where the first character of the line indicates whether or not a label is present; it also supports an improved free format convention. The improved format requires that a comment line must start with an asterisk in column 1; any other character indicates that the line contains assemblable code. Labels and opcodes may start in any column, including column 1. Leading spaces are ignored. A label is defined when the character string is terminated by a colon; for example,

```
LBL1: STA A 3,X
```

is a legitimate line of source code that defines a label. Any line that does not include a colon immediately after the first token is assumed to start with an opcode or a macro name.

CUSTOMIZING

The XREF program was written to be easily modified. The jump table starting at address 0100 contains vectors to all I/O and system subroutines used. These pointers may be changed to suit your system. The text strings used for console interaction all reside in the TEXT STRINGS table. You may wish to change these, particularly in the forms control characters. Note that patch areas have been left in key locations here, so that more characters may be added if desired.

The 'end of string' character used in this program is a control-D (04); if your system uses something different, change the character at the end of each control message. Note: the same character is used by the XREF program itself in the table output routine; do not change the printer output strings unless you also change the PSTR and PCHAR routines.

Page 0 of the program includes numerous constants useful in controlling the the input and output format of the program. LCOUNT is the number of lines per page (66 as supplied). PPLEN and SPLEN are the number of reference line numbers printed per line of output; if you have a 32 column list device, set this to 3; if you have a 40 column device (such as a PR-40), set this to 4; if you have a 72 column device (such as a TTY), set this to 9; if you have an 80 column device, set this to 10. The PPLEN variable is used for the output device on a parallel port, while SPLEN is used for a serial port. PPORT and SPORT are the I/O addresses of your list devices; the PPORT variable is set to 801C (slot 7) as supplied, while SPORT (serial port) is set to 800C (slot 3).

PGON is the page option switch; putting a 0 value here will suppress pagination. MAXMEM will hold the highest usable memory address; if you wish the XREF program to automatically size memory at sign-on, set this value to 0. Otherwise, whatever value you place here will be the highest address used by the program. TABSTA is the starting address of the symbol table; if you wish to create a patch area between the end of the program and the beginning of the table, set TABSTA to a larger value. Or if you wish to locate the table at some arbitrary address, place the value of that address into TABSTA. TABEND must not be modified by the user; this is a program controlled pointer to one location past the end of the table. TBUF holds the value of the starting address of the input buffer, while TBUFE holds the value of one plus the end address of the input buffer. If you have a system input buffer area already, put its start address and its end address+1 into these locations. LBUF and LBUFE hold the starting and end+1 addresses for the line buffer. If you wish to move this, place your new address values into these locations. LCHAR contains the number of characters to be ignored at the beginning of each line; this is set to 0 as supplied. This is useful for ignoring control characters, nulls, rubouts, and other garbage that some editors include with the text. For example, if your input file has each line terminated with CR, LF, RUB, RUB as is sometimes done with TTYs, set LCHAR to 3 to ignore the LF and the two rubouts. XREF assumes that a CR is the last character of any line, and that anything following it belongs to the next line. EOF is the end of file character, control Z as supplied. If your system uses a different character, change the value stored in this location.

The opcode tables in this program include all the Motorola 6800 opcode mnemonics and pseudo-ops, plus BLO, BHS, and TTL. If you wish to include new opcodes, they can be added into the tables by the following convention: the mnemonic is entered as an FCC string, followed by an attributes byte. The attributes byte is 0 if if the instruction takes no arguments (no operands), or 1 if the instruction references memory, or 2 if the instruction references an accumulator, or 3 if it references both accumulator and memory. Any opcode included in the tables will not appear on a cross reference listing.

SAMPLE PROGRAM

```
0001                         TTL  XREF          SAMPLE PROGRAM
0002                         OPT  PAG,NOG,NOS
0003  1000          ABC      EQU  $1000
0004  1000          X00      EQU  ABC
0005  E0E3          MONIT    EQU  $E0E3         MONITOR'S ADDRESS
0006  1000                   ORG  X00
0007  1000 CE 2800           LDX  #$1800+ABC    EXPRESSION IN OPERAND FIELD
0008  1003 A6 00    LOOPAN   LDA  A 0,X         INDEXING
0009  1005 B7 0F80           STA  A X00-128
0010  1008 08                INX
0011  1009 8C 5000           CPX  #ABC+$4000
0012  100C 26 F5             BNE  LOOPANDCOUNT
0013  100E 7E E0E3           JMP  MONIT
0014  1011          MM       RMB  1
0015                         END
   NO ERROR(S) DETECTED
```

```
6800 CROSS REFERENCE PROGRAM
        VERSION 1.0


SYMBOL DEFINED REFERENCED
====== ======= ==========

ABC          3 :    4     7    11
LOOPAN       8 :   12
MM          14 :
MONIT        5 :   13
X00          4 :    6     9


TOTAL SYMBOLS:      5
```

SEE FIGURE 1

SYMBOL TABLE STRUCTURE

```
BEGT: 41   'A
      42   'B
      43   'C
      20   SP
      20   SP
      20   SP
      00   } defined in line 3
      03   }
      00   } referenced in line 4
      04   }
      00   } referenced in line 7
      07   }
      00   } referenced in line 11
      0B   }
      FF   } end of entry
      FF   }
      4C   'L
      4F   'O
      4F   'O
      50   'P
      20   SP
      20   SP
      00   } defined in line 8
      08   }
      00   } referenced in line 12
      0C   }
      FF   } end of entry
      FF   }
      4D   'M
      4D   'M
      20   SP
      20   SP
      20   SP
      20   SP
      00   }
      0E   } defined in line 14
           <-note: no reference
      FF   } end of entry
      FF   }
       :
       :
```

Figure 1

```
                 0001          TTL    XREF
                 0002          OPT    NOG,PAG,NOS
                 0003 *
                 0004 *  6800 CROSS REFERENCE TABLE GENERATOR
                 0005 *  BY BOB HALE AND PAUL SEARBY
                 0006 *  REVISED 6-1-79; MINOR IMPROVEMENTS
                 0007 *
                 0008 *EQUATES
                 0009 *
0031             0010 VER    EQU    '1
0033             0011 REV    EQU    '3
                 0012 *
D000             0013 DISK   EQU    $D000
D280             0014 ZCOLD  EQU    $280+DISK   DISK SYSTEM ENTRY POINTS
D291             0015 ZFLSPC EQU    $291+DISK
D297             0016 ZGNCHR EQU    $297+DISK
D2A9             0017 ZTYPDE EQU    $2A9+DISK
D302             0018 YMEMAX EQU    $302+DISK   DOS PARM TBL MEMAX
D783             0019 CDFM   EQU    $783+DISK
D786             0020 DFM    EQU    $786+DISK
0000             0021 XFC    EQU    0
0004             0022 QO4R   EQU    4
                 0023 *
E1AC             0024 INEEE  EQU    $E1AC
E1D1             0025 OUTEEE EQU    $E1D1
E1AC             0026 KBD    EQU    INEEE       KEYBOARD
E1D1             0027 CONS   EQU    OUTEEE      CONSOLE
D283             0028 CONTRL EQU    $283+DISK   SYSTEM MONITOR ENTRY POINT
001A             0029 EOFC   EQU    $1A         EOF CHAR
003A             0030 SYMC   EQU    ':          SYMBOL TERMINATOR
002A             0031 COMCHR EQU    $2A         COMMENT CHARACTER
0020             0032 SPACE  EQU    $20         SPACE
0003             0033 CREOF  EQU    3           CO-RES EOF CHAR
5FFF             0034 MEMMAX EQU    $5FFF       FOR DOS68.50
                 0035 *
00A0             0036        ORG    $A0
                 0037 *
                 0038 *VARIABLE STORAGE IN PAGE 0
                 0039 *
00A0             0040 TYPORT RMB    1           OUTPUT PORT TYPE
00A1             0041 NSYM   RMB    2           # OF SYMBOLS CTR
00A3             0042 ENDSYM RMB    2           SYMBOL PARSING PTR
00A5             0043 BEGSYM RMB    2           SYMBOL PARSING PTR
00A7             0044 SYMLEN RMB    1           SYMBOL LENGTH
00A8             0045 MRI    RMB    1           OPCODE TYPE FLAGS
00A9             0046 OPCEND RMB    2           TEMP TABLE PTR
00AB             0047 CSYM   RMB    2           SYMBOL STARTING ADDR
00AD             0048 AFTER  RMB    2           TEMP SYMTAB PTR
00AF             0049 BEFORE RMB    2           TEMP SYMTAB PTR
                 0050 *
                 0051 * TEMPORY SAVE REGISTERS
                 0052 *
00B1             0053 ASAVE  RMB    1
00B2             0054 BSAVE  RMB    1
00B3             0055 XSAVE  RMB    2
00B5             0056 XTEM1  RMB    2
00B7             0057 XTEM2  RMB    2
00B9             0058 XTEM3  RMB    2
00BB             0059 DX     RMB    2           TEMP X
```

```
00BD            0060 SX      RMB    2           TEMP X
                0061 *
00BF            0062 LNUM    RMB    2           CURRENT LINE #
00C1            0063 LLNUM   RMB    2           LINE # FROM FILE
00C3            0064 TBUFP   RMB    2           FILE BUFFER PTR
00C5            0065 LBUFP   RMB    2           LINE BUFFER PTR
00C7            0066 LENT    RMB    2           SYMTAB LENGTH
00C9            0067 DDEND   RMB    2           DIVIDEND
00CB            0068 DSOR    RMB    2           DIVISOR
00CD            0069 REM     RMB    2           REMAINDER
00CF            0070 NSPAC   RMB    1           # SPACES TO NAME
00D0            0071 NLINE   RMB    1           LINES REMAINING
00D1            0072 COLS    RMB    1           COLUMNS REMAINING
00D2            0073 LINLEN  RMB    1
00D3            0074 DECNO   RMB    5           DECIMAL # STRING
00D8 04         0075 DECNOE  FCB    4
00D9            0076 SYMBOL  RMB    6           SINGLE SYMBOL BFR
00DF 04         0077 SYMBE   FCB    4
00E0 42         0078 LCOUNT  FCB    66          # OF LINES PER PAGE
00E1 00         0079 LCHAR   FCB    0           # OF LEADING CHARS PER LINE
00E2 00         0080 LNFLG   FCB    0           0=NO # ELSE LINE #'S
00E3 0A         0081 PPLEN   FCB    10          PARALLEL PTR LINE LENGTH
00E4 0A         0082 SPLEN   FCB    10          SERIAL PTR LINE LENGTH
00E5 67 FF      0083 MAXMEM  FDB    $67FF       MAX USABLE MEM LOCN
00E7 80 0C      0084 SPORT   FDB    $800C       SERIAL PORT#3
00E9 17         0085 ACRC1   FCB    $17         ACIA RESET CODE
00EA 15         0086 ACRC2   FCB    $15         ACIA RUN CODE
                0087 *PPORT  FDB $8018 PARALLEL PORT#6
00EB 80 1C      0088 PPORT   FDB    $801C       PARALLEL PORT#7
00ED 50         0089 DPORT   FCB    'P          DEFAULT PORT - PARALLEL
00EE 1A         0090 EOF     FCB    EOFC        END FILE CHAR
00EF 0E 88      0091 TABEND  FDB    BEGT+1      SYMTAB END - DYNAMIC
00F1 0E 87      0092 TABSTA  FDB    BEGT        SYMTAB START; IS CONSTANT
00F3 01         0093 PGON    FCB    1           PAGE OPTION SWITCH
00F4 0D 49      0094 LBUF    FDB    LBUFZ       LINE BFR START
00F6 0D D5      0095 LBUFE   FDB    LBUFEZ      LINE BFR END+1
00F8 0D E1      0096 RFCBP   FDB    RFCB        DISK BUFFER START
                0097 *
                0098 *ALL THE PRECEEDING MUST BE IN RAM;
                0099 *THE REMAINDER OF THIS PROGRAM
                0100 *MAY BE ORGED AT ANY ADDRESS, AND
                0101 *MAY BE PLACED IN ROM.
                0102 *
0100            0103         ORG    $100
0100 7E 0221    0104 START   JMP    HSTART      START OF PROGRAM
0103 7E 026B    0105         JMP    REPRIN      REPRINT THE TABLE
0106 7E E1AC    0106 KREAD   JMP    KBD         KEYBOARD READ
0109 7E E1D1    0107 TCONS   JMP    CONS        TYPE CHAR ON CONSOLE
010C 7E D283    0108 MONIT   JMP    CONTRL      JUMP TO THE MONITOR
010F 7E 039B    0109 READ    JMP    READD       DISK READ ROUTINE
0112 7E 0353    0110 OPEN    JMP    OPEND       DISK INITIALIZATION AND OPEN RTN
0115 7E 03DB    0111 INITIO  JMP    INTOUT      INITIALIZE OUTPUT DEVICE
0118 7E 0415    0112 IOOUT   JMP    PSOUT       PARALLEL AND SERIAL OUTPUT
                0113 *
                0114 *TEXT STRINGS
                0115 *
011B 00 0D      0116 MES1    FDB    $0D, $0A, $0D, $0A
0123 36         0117         FCC    '6800 CROSS REFERENCE'
0137 0D         0118 CRLF    FCB    $D, 0, $A, 0, $0, 4
013D            0119         RMB    5           PATCH AREA
```

```
0142 53        0120 MES2    FCC    'SYMBOL TABLE FULL'
0153 04        0121         FCB    4
0154 20        0122 MES3    FCC    '         VERSION '
0164 31        0123         FCB    VER,'.,REV
0167 04        0124         FCB    4
0168 53        0125 MES5    FCC    'SYMBOL DEFINED REFERENCED'
0181 04        0126         FCB    4
0182 54        0127 MES6    FCC    'TOTAL SYMBOLS:  '
0191 04        0128         FCB    4
0192 36        0129 MES7    FCC    '6800 CROSS REFERENCE PROGRAM'
01AE 04        0130         FCB    4
01AF 46        0131 MES8    FCC    'FILE READ COMPLETE'
01C1 04        0132         FCB    4
01C2 3D        0133 MES9    FCC    '====== ======= ========='
01DB 0D        0134         FCB    $D,$A,$4
01DE 46        0135 MES10   FCC    'FILE NAME:  '
01E9 04        0136         FCB    4
01EA 0D        0137 CR4     FCB    $D,$A
01EC 0D        0138 CR3     FCB    $D,$A
01EE 0D        0139 CR2     FCB    $D,$A
01F0 0D        0140 CRS     FCB    $D,$A,4
01F3 20        0141 SP4     FCB    $20,$3A,$04 COLON - SPACE
01F6 20        0142 S15     FCC    '             '
0204 04        0143         FCB    4
0205 0D        0144 EOP     FCB    $D,$A,$D,$A,$D,$A
020B 2D        0145         FCC    '---'
020E 0D        0146         FCB    $D,$A,$D,$A,$D,$A,$D,$A,$4
0217           0147         RMB    10           PATCH AREA
               0148 *
               0149 * START EXECUTION HERE
               0150 *
0221 BD 030E 0151 HSTART  JSR    SIZMEM       GET MEMORY SIZE
0224 BD 032A 0152         JSR    CLLBUF
0227 CE 0000 0153         LDX    #0
022A DF BF   0154         STX    LNUM
022C DF C1   0155         STX    LLNUM
022E DF C7   0156         STX    LENT
0230 BD 0334 0157         JSR    CLTABLE      CLEAR SYMBOL TBL
0233 CE 0DD5 0158         LDX    #LBUFEZ
0236 DF C3   0159         STX    TBUFP
0238 BD 07B9 0160         JSR    FENDT
023B BD 033F 0161         JSR    CLSYM
023E 96 ED   0162         LDA A DPORT       DEFAULT OUTPUT
0240 97 A0   0163         STA A TYPORT
0242 96 E4   0164         LDA A SPLEN
0244 97 D2   0165         STA A LINLEN
0246 CE 011B 0166         LDX    #MES1
0249 BD 0455 0167         JSR    TELOP        TELL THE OPERATOR
024C BD 0112 0168         JSR    OPEN         DISK INIT AND OPEN
024F BD 0115 0169         JSR    INITIO
0252 BD 0A13 0170         JSR    FNAME        GET FILE NAME FROM FCB
0255 BD 0A00 0171         JSR    FOPEN        FILE IS OPEN; PRINT FN
             0172 *
             0173 *MAIN LOOP
             0174 *
0258 BD 045C 0175 MAIN    JSR    GLINE        GET A LINE
025B 91 EE   0176         CMP A EOF         IS IT EOF?
025D 26 12   0177         BNE    BPARSE       NO.
025F CE 01AF 0178         LDX    #MES8        YES - TELL OPERATOR
0262 BD 0455 0179         JSR    TELOP
```

```
0265 CE 0137 0180        LDX    #CRLF
0268 BD 0455 0181        JSR    TELOP
026B BD 0873 0182 REPRIN JSR    PTABLE       EOF; PRINT TABLE
026E 7E 010C 0183        JMP    MONIT        DONE
             0184 *
0271 DE F4   0185 BPARSE LDX    LBUF         BEGIN PARSING AT FIRST CHAR ...
0273 DF A3   0186        STX    ENDSYM       .. OF LINE BUFFER
0275 A6 00   0187        LDA A  0,X
0277 81 2A   0188        CMP A  #COMCHR      COMMENT?
0279 27 DD   0189        BEQ    MAIN         YES
             0190 *
027B BD 0509 0191 PARL   JSR    PARSE        FIND A SYMBOL
027E DE A5   0192        LDX    BEGSYM
0280 27 D6   0193        BEQ    MAIN         NO SYMBOLS LEFT
0282 9C F4   0194        CPX    LBUF
0284 27 08   0195        BEQ    TSRCH1       STARTS IN COL 1
0286 DE A3   0196        LDX    ENDSYM
0288 A6 00   0197        LDA A  0,X
028A 81 3A   0198        CMP A  #SYMC        COLON?
028C 26 1D   0199        BNE    TSRCH2       NO
             0200 *
028E BD 05A4 0201 TSRCH1 JSR    SSRCH        SYMBOL SEARCH
0291 DE AB   0202        LDX    CSYM
0293 26 10   0203        BNE    IDEF         FOUND IT
0295 BD 0676 0204        JSR    OSRCH        TRY FOR OPCODE
0298 96 A8   0205        LDA A  MRI
029A 26 26   0206        BNE    ACRTST       WAS AN OPCODE
029C BD 0719 0207        JSR    ADDSYM       MUST BE A SYMBOL
029F BD 07AE 0208        JSR    INSDEF       INSERT DEF
02A2 7E 027B 0209        JMP    PARL         GO FOR MORE
             0210 *
02A5 BD 07A8 0211 IDEF   JSR    INSDF6       INSERT THE DEFINITION
02A8 7E 027B 0212        JMP    PARL
             0213 *
02AB BD 0676 0214 TSRCH2 JSR    OSRCH        OPCODE?
02AE 96 A8   0215        LDA A  MRI
02B0 26 10   0216        BNE    ACRTST       YES
02B2 BD 05A4 0217        JSR    SSRCH        NOT OPCODE, TRY SYMBOL
02B5 DE AB   0218        LDX    CSYM
02B7 26 03   0219        BNE    ADREF        WAS A SYMBOL
02B9 BD 0719 0220        JSR    ADDSYM       INSERT NEW SYMBOL
             0221 *
02BC BD 07C6 0222 ADREF  JSR    ADDREF       INSERT REF
02BF 7E 027B 0223        JMP    PARL         GO FOR MORE
             0224 *
02C2 96 A8   0225 ACRTST LDA A  MRI
02C4 DE A3   0226        LDX    ENDSYM
02C6 85 02   0227        BIT A  #2           AC REF BIT
02C8 27 03   0228        BEQ    IACK         NOT AC REF
02CA BD 080A 0229        JSR    SMASH        SQUEEZE OUT EXTRA SPACE
             0230 *
02CD 85 01   0231 IACK   BIT A  #1           MRI CHECK
02CF 26 03   0232        BNE    TLINE        IS AN MRI
02D1 7E 0258 0233        JMP    MAIN         GET NEXT LINE
02D4 BD 0842 0234 TLINE  JSR    EPARSE       FIND NEXT EXPRESSION
02D7 DF A3   0235        STX    ENDSYM
02D9 7E 027B 0236        JMP    PARL
             0237 *
             0238 *OVERFLOW DUMP
             0239 *
```

```
02DC BD 0873 0240 OVERF  JSR   PTABLE       PRINT THE TABLE
02DF BD 0A5C 0241        JSR   PURGE        REMOVE DEFINED REFS
02E2 BD 0AC4 0242        JSR   FLB          CHECK MEMORY AVAILABLE
02E5 BD 07FD 0243        JSR   MEMREM
02E8 26 1F   0244        BNE   OVR1         LOTS LEFT
02EA C0 28   0245        SUB B #40
02EC 24 1B   0246        BCC   OVR1         AT LEAST 40 LEFT
02EE CE 0137 0247        LDX   #CRLF        NO ROOM - TELL OPERATOR
02F1 BD 0455 0248        JSR   TELOP
02F4 CE 0137 0249        LDX   #CRLF
02F7 BD 0455 0250        JSR   TELOP
02FA CE 0142 0251        LDX   #MES2
02FD BD 0455 0252        JSR   TELOP
0300 CE 0137 0253        LDX   #CRLF
0303 BD 0455 0254        JSR   TELOP
0306 7E 010C 0255        JMP   MONIT        ... AND GIVE UP!
0309 DE F4   0256 OVR1   LDX   LBUF         RESET TO START OF LINE ...
030B 7E 027B 0257        JMP   PARL         AND CONTINUE
             0258 *
             0259 *SETUP ROUTINES
             0260 *
030E FE D302 0261 SIZMEM LDX   YMEMAX       MEMORY SIZER
0311 DF E5   0262        STX   MAXMEM       SAVE IN XREF MEM LIMIT
0313 26 14   0263        BNE   FSIZ3
0315 DE F1   0264        LDX   TABSTA
0317 09      0265        DEX
0318 86 55   0266        LDA A #$55
031A 08      0267 FSIZ1  INX
031B 8C 5FFF 0268        CPX   #MEMMAX      MAX MEM
031E 27 07   0269        BEQ   FSIZE2
0320 A7 00   0270        STA A 0,X
0322 A1 00   0271        CMP A 0,X
0324 27 F4   0272        BEQ   FSIZ1
0326 09      0273        DEX
0327 DF E5   0274 FSIZE2 STX   MAXMEM       LAST USABLE LOCATION
0329 39      0275 FSIZ3  RTS
             0276 *
032A DE F4   0277 CLLBUF LDX   LBUF         CLEAR LINE BUF
032C 6F 00   0278 CLL1   CLR   X
032E 08      0279        INX
032F 9C F6   0280        CPX   LBUFE
0331 26 F9   0281        BNE   CLL1
0333 39      0282        RTS
             0283 *
0334 DE F1   0284 CLTABL LDX   TABSTA       CLEAR SYMBOL TABLE
0336 09      0285        DEX
0337 08      0286 CLS1   INX
0338 6F 00   0287        CLR   X
033A 9C E5   0288        CPX   MAXMEM
033C 26 F9   0289        BNE   CLS1
033E 39      0290        RTS
             0291 *
033F 36      0292 CLSYM  PSH A              CLEAR SYMBOL BUFFER
0340 DF B5   0293        STX   XTEM1
0342 86 20   0294        LDA A #SPACE
0344 CE 00D9 0295        LDX   #SYMBOL
0347 A7 00   0296 CLSM1  STA A 0,X
0349 08      0297        INX
034A 8C 00DF 0298        CPX   #SYMBE
034D 26 F8   0299        BNE   CLSM1
```

```
034F DE B5    0300          LDX    XTEM1
0351 32       0301          PUL A
0352 39       0302          RTS
              0303 *
              0304 * I/O DRIVERS
              0305 *
0353 DF B3    0306 OPEND    STX    XSAVE
0355 DE F8    0307          LDX    RFCBP
0357 BD D291  0308          JSR    ZFLSPC        READ FILE SPECS
035A 25 65    0309          BCS    EXIT          BRANCH IF ERROR
035C BD D297  0310          JSR    ZGNCHR        READ NEXT CHAR
035F 81 53    0311          CMP A #'S            IS IT SERIAL
0361 26 08    0312          BNE    OPEN2         NO - TAKE DEFAULT
0363 86 53    0313          LDA A #'S            SET UP FOR SERIAL
0365 97 A0    0314          STA A TYPORT
0367 96 E4    0315          LDA A SPLEN
0369 97 D2    0316          STA A LINLEN
              0317 *
              0318 * CHECK FOR CO-RES FILE AND SET-UP
              0319 *
036B BD D297  0320 OPEN2    JSR    ZGNCHR        READ NEXT CHAR
036E 81 0D    0321          CMP A ##$0D          IS IT A CARR RET?
0370 27 0F    0322          BEQ    OPEN6         YES - DEFAULT IS SSB FORMAT
0372 BD D297  0323          JSR    ZGNCHR        READ NEXT CHAR
0375 81 43    0324          CMP A #'C            IS THIS A CO-RES FILE?
0377 26 08    0325          BNE    OPEN6
0379 86 06    0326          LDA A ##$06
037B 97 E1    0327          STA A LCHAR          NO.  OF CHARS TO PASS OVER
037D 86 03    0328          LDA A #CREOF
037F 97 EE    0329          STA A EOF            CO-RES EOF CHAR = $03
              0330 *
              0331 * OPEN DISK FILE FOR READ
              0332 *
0381 DE F8    0333 OPEN6    LDX    RFCBP
0383 86 04    0334          LDA A #Q04R
0385 A7 00    0335          STA A XFC,X
0387 BD D786  0336          JSR    DFM
038A 26 2F    0337          BNE    ERR
038C 6C 00    0338          INC    XFC,X
038E DE B3    0339          LDX    XSAVE
0390 39       0340          RTS
              0341 *
0391          0342          RMB    10            I/O PATCH AREA #1
              0343 *
              0344 * READ FROM DISK FILE
              0345 *
039B DF B3    0346 READD    STX    XSAVE
039D D7 B2    0347          STA B BSAVE
039F DE F8    0348          LDX    RFCBP
03A1 BD D786  0349          JSR    DFM
03A4 26 09    0350          BNE    RERR
03A6 91 EE    0351          CMP A EOF            EOF?
03A8 27 24    0352          BEQ    CLOSE
03AA DE B3    0353 READ1    LDX    XSAVE
03AC D6 B2    0354          LDA B BSAVE
03AE 39       0355          RTS
              0356 *
              0357 * DISK ERROR (OR EOF) HANDLING
              0358 *
03AF A6 01    0359 RERR     LDA A 1,X
```

```
03B1 81 06   0360        CMP A #6
03B3 27 19   0361        BEQ   CLOSE
03B5 BD D2A9 0362        JSR   ZTYPDE
03B8 4F      0363        CLR A
03B9 20 EF   0364        BRA   READ1
             0365 *
03BB BD D2A9 0366 ERR    JSR   ZTYPDE
03BE BD D783 0367        JSR   CDFM
03C1 7E D280 0368 EXIT   JMP   ZCOLD
             0369 *
03C4         0370        RMB   10          I/O PATCH AREA #2
             0371 *
             0372 * DISK CLOSE ROUTINE
             0373 *
03CE DE F8   0374 CLOSE  LDX   RFCBP
03D0 6C 00   0375        INC   XFC,X
03D2 BD D786 0376        JSR   DFM
03D5 26 E4   0377        BNE   ERR
03D7 96 EE   0378        LDA A EOF         EOF?
03D9 20 CF   0379        BRA   READ1
             0380 *
             0381 * INITIALIZE OUTPUT PORT(S)
             0382 *
03DB 8D 2A   0383 INTOUT BSR   SAVER
03DD C6 53   0384        LDA B #'S
03DF D1 A0   0385        CMP B TYPORT
03E1 27 0E   0386        BEQ   SINIT
             0387 *
03E3 DE EB   0388 PINIT  LDX   PPORT
03E5 5F      0389        CLR B
03E6 E7 01   0390        STA B 1,X
03E8 53      0391        COM B
03E9 E7 00   0392        STA B 0,X
03EB C6 3F   0393        LDA B #$3F
03ED E7 01   0394        STA B 1,X
03EF 20 1D   0395        BRA   RESTOR
             0396 *
03F1 DE E7   0397 SINIT  LDX   SPORT
03F3 D6 E9   0398        LDA B ACRC1
03F5 E7 00   0399        STA B 0,X
03F7 D6 EA   0400        LDA B ACRC2
03F9 E7 00   0401        STA B 0,X
03FB 20 11   0402        BRA   RESTOR
             0403 *
03FD         0404        RMB   10          I/O PATCH AREA #3
             0405 *
             0406 * COMMON SAVE AND RESTORE RTNS
             0407 *
0407 DF B3   0408 SAVER  STX   XSAVE
0409 97 B1   0409        STA A ASAVE
040B D7 B2   0410        STA B BSAVE
040D 39      0411        RTS
             0412 *
040E DE B3   0413 RESTOR LDX   XSAVE
0410 96 B1   0414        LDA A ASAVE
0412 D6 B2   0415        LDA B BSAVE
0414 39      0416        RTS
             0417 *
             0418 *OUTPUT TO EITHER SERIAL OR PARALLEL PORT
             0419 *
```

```
0415 8D F0    0420 PSOUT  BSR   SAVER
0417 C6 53    0421        LDA B #'S
0419 D1 A0    0422        CMP B TYPORT
041B 27 1E    0423        BEQ   SOUT
              0424 *
041D DE EB    0425 POUT   LDX   PPORT
041F A7 00    0426        STA A 0,X         OUTPUT CHAR
0421 86 37    0427        LDA A #$37
0423 A7 01    0428        STA A 1,X         STROBE IT
0425 86 3F    0429        LDA A #$3F
0427 A7 01    0430        STA A 1,X         END STROBE
0429 6D 01    0431 POUT1  TST   1,X         WAIT FOR ACKNOWLEDGE
042B 2A FC    0432        BPL   POUT1
042D A6 00    0433        LDA A 0,X         CLEAR THE FLAG
042F 20 DD    0434        BRA   RESTOR
              0435 *
0431          0436        RMB   10          I/O PATCH AREA #4
              0437 *
043B DE E7    0438 SOUT   LDX   SPORT
              0439 *
043D C6 02    0440 SOUT1  LDA B #$02
043F E4 00    0441        AND B 0,X
0441 27 FA    0442        BEQ   SOUT1
0443 A7 01    0443        STA A 1,X
0445 20 C7    0444        BRA   RESTOR
              0445 *
0447          0446        RMB   10          I/O PATCH AREA #5
              0447 *
0451 BD 0109  0448 TEL1   JSR   TCONS
0454 08       0449        INX
0455 A6 00    0450 TELOP  LDA A 0,X         STRING TO CONSOLE
0457 81 04    0451        CMP A #4
0459 26 F6    0452        BNE   TEL1
045B 39       0453        RTS
              0454 *
              0455 ******
              0456 *
045C D6 E1    0457 GLINE  LDA B LCHAR       GET A LINE FROM FILE
045E BD 032A  0458        JSR   CLLBUF      CLR LINE BUF
0461 DE F4    0459        LDX   LBUF
0463 DF C5    0460        STX   LBUFP
0465 86 03    0461        LDA A #CREOF
0467 91 EE    0462        CMP A EOF
0469 26 02    0463        BNE   GL1
046B 97 E2    0464        STA A LNFLG
046D BD 010F  0465 GL1    JSR   READ        GET NEXT CHAR
0470 81 02    0466        CMP A #$02        CO-RES START CHAR?
0472 27 0F    0467        BEQ   GL35        YES - GET FIRST LINE NO
0474 91 EE    0468        CMP A EOF
0476 27 06    0469        BEQ   GL3
0478 5D       0470        TST B             ANY LEADING CHARS?
0479 27 0C    0471        BEQ   GL4         NONE LEFT
047B 5A       0472        DEC B
047C 20 EF    0473        BRA   GL1
              0474 *
047E DE C5    0475 GL3    LDX   LBUFP
0480 A7 00    0476        STA A 0,X
0482 39       0477        RTS
              0478 *
0483 BD 010F  0479 GL35   JSR   READ
```

```
0486 5F        0480          CLR B
               0481 *
0487 7D 00E2   0482 GL4      TST    LNFLG       LINE #S FROM SOURCE?
048A 27 02     0483          BEQ    GL45        NO
048C 8D 30     0484          BSR    GLNUM       YES, GET IT
048E 81 20     0485 GL45     CMP A #$20         VALID CHAR?
0490 24 04     0486          BCC    GL5         YES
0492 81 0D     0487          CMP A #$D
0494 26 D7     0488          BNE    GL1         BAD CHAR - IGNORE IT
0496 DE C5     0489 GL5      LDX    LBUFP
0498 A7 00     0490          STA A 0,X          PUT CHAR INTO LINE BUF
049A 08        0491          INX
049B DF C5     0492          STX    LBUFP
049D 81 0D     0493          CMP A #$D
049F 26 10     0494          BNE    GL9
04A1 DE C1     0495          LDX    LLNUM
04A3 26 09     0496          BNE    GL8
04A5 7C 00C0   0497          INC    LNUM+1
04A8 26 03     0498          BNE    GL6
04AA 7C 00BF   0499          INC    LNUM
04AD 39        0500 GL6      RTS
               0501 *
04AE DF BF     0502 GL8      STX    LNUM
04B0 39        0503          RTS
04B1 9C F6     0504 GL9      CPX    LBUFE       OVERFLOW?
04B3 26 B8     0505          BNE    GL1         NO
04B5 09        0506          DEX                YES, FORCE CR
04B6 86 0D     0507          LDA A #$D
04B8 A7 00     0508          STA A 0,X
04BA DF C5     0509          STX    LBUFP
04BC 20 AF     0510          BRA    GL1
               0511 *
               0512 *****
               0513 *
04BE 7D 00E2   0514 GLNUM    TST    LNFLG
04C1 26 01     0515          BNE    GLN1        YES - LINE NOS.
04C3 39        0516          RTS
               0517 *
04C4 7F 00C1   0518 GLN1     CLR    LLNUM
04C7 7F 00C2   0519          CLR    LLNUM+1
04CA 37        0520          PSH B
               0521 *
04CB 36        0522 GLN2     PSH A
04CC 81 30     0523          CMP A #'0          ZERO
04CE 2B 2C     0524          BMI    GLN6        NOT NUMERIC - DONE
04D0 81 39     0525          CMP A #'9          NINE
04D2 2E 28     0526          BGT    GLN6        NOT NUMERIC - DONE
04D4 D6 C2     0527          LDA B LLNUM+1      MULT LLNUM BY 10
04D6 17        0528          TBA
04D7 58        0529          ASL B
04D8 79 00C1   0530          ROL    LLNUM       TIMES 2
04DB 58        0531          ASL B
04DC 79 00C1   0532          ROL    LLNUM       TIMES 4
04DF 1B        0533          ABA                TIMES 5
04E0 24 03     0534          BCC    GLN4
04E2 7C 00C1   0535          INC    LLNUM
04E5 48        0536 GLN4     ASL A
04E6 97 C2     0537          STA A LLNUM+1
04E8 79 00C1   0538          ROL    LLNUM       TIMES 10
04EB 32        0539          PUL A
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04EC 80 30   0540          SUB A #'0
04EE 9B C2   0541          ADD A LLNUM+1       ADD THE DIGIT
04F0 97 C2   0542          STA A LLNUM+1
04F2 24 03   0543          BCC   GLN5
04F4 7C 00C1 0544          INC   LLNUM
             0545 *
04F7 BD 010F 0546 GLN5     JSR   READ          GET THE NEXT CHAR
04FA 20 CF   0547          BRA   GLN2
             0548 *
04FC 32      0549 GLN6     PUL A
04FD 33      0550          PUL B
04FE 7F 00E2 0551          CLR   LNFLG
0501 81 20   0552          CMP A #$20          SPACE?
0503 26 03   0553          BNE   GLN9
0505 7E 010F 0554          JMP   READ
0508 39      0555 GLN9     RTS
             0556 *
             0557 *****
             0558 *
0509 7F 00A5 0559 PARSE    CLR   BEGSYM        PARSE THE LINE FOR...
050C 7F 00A6 0560          CLR   BEGSYM+1      ...THE NEXT SYMBOL
050F BD 033F 0561          JSR   CLSYM
0512 DE A3   0562          LDX   ENDSYM        END OF LAST SYMBOL
0514 A6 00   0563 PAR1     LDA A 0,X
0516 81 5A   0564          CMP A #'Z           ALPHA?
0518 2E 12   0565          BGT   PAR4
051A 81 41   0566          CMP A #'A
051C 2B 0E   0567          BMI   PAR4
051E DF A5   0568          STX   BEGSYM        IS ALPHA
0520 08      0569 PAR2     INX
0521 A6 00   0570          LDA A 0,X
0523 8D 2B   0571          BSR   ALPHAN
0525 27 F9   0572          BEQ   PAR2          IS ALPHANUMERIC
0527 DF A3   0573 PAR3     STX   ENDSYM
0529 7E 0567 0574          JMP   SCOPY         MOVE IT TO SYMBOL BFR
052C 81 40   0575 PAR4     CMP A #$40          AT SIGN
052E 27 10   0576          BEQ   PAR7
0530 81 25   0577          CMP A #'%
0532 27 0C   0578          BEQ   PAR7
0534 81 24   0579          CMP A #'$
0536 27 08   0580          BEQ   PAR7
0538 81 27   0581          CMP A #$27          APOSTROPHE
053A 26 0B   0582          BNE   PAR8
053C 08      0583          INX
053D 08      0584 PAR5     INX
053E 20 D4   0585          BRA   PAR1
0540 08      0586 PAR7     INX
0541 A6 00   0587          LDA A 0,X
0543 8D 0B   0588          BSR   ALPHAN
0545 27 F9   0589          BEQ   PAR7          WAS ALPHANUMERIC
0547 81 0D   0590 PAR8     CMP A #$D           CR?
0549 27 DC   0591          BEQ   PAR3
054B 4D      0592          TST A               END OF LINE?
054C 27 D9   0593          BEQ   PAR3          WAS A NULL - END OF LINE
054E 20 ED   0594          BRA   PAR5
             0595 *
             0596 *****
             0597 *
0550 4D      0598 ALPHAN   TST A               IS ACCA AN ALPHANUMERIC?
0551 26 02   0599          BNE   ALPH1
```

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0553 43      0600        COM A
0554 39      0601        RTS
0555 81 5A   0602 ALPH1  CMP A #'Z
0557 2E 0D   0603        BGT   ALPH5       ISN'T
0559 81 41   0604        CMP A #'A
055B 2A 08   0605        BPL   ALPH2       IS OK
055D 81 39   0606        CMP A #'9
055F 2E 05   0607        BGT   ALPH5
0561 81 30   0608        CMP A #'0
0563 2B 01   0609        BMI   ALPH5
0565 4F      0610 ALPH2  CLR A             RETURN 0 IF ALPHANUMERIC
0566 39      0611 ALPH5  RTS
             0612 *
             0613 *****
             0614 *
0567 DF B5   0615 SCOPY  STX   XTEM1       COPY SYMBOL FROM LINE TO BUF
0569 BD 033F 0616        JSR   CLSYM
056C DE A5   0617        LDX   BEGSYM
056E 36      0618        PSH A
056F A6 00   0619        LDA A X
0571 97 D9   0620        STA A SYMBOL
0573 08      0621        INX
0574 9C A3   0622        CPX   ENDSYM
0576 27 28   0623        BEQ   SCOP4
0578 A6 00   0624        LDA A X
057A 97 DA   0625        STA A SYMBOL+1
057C 08      0626        INX
057D 9C A3   0627        CPX   ENDSYM
057F 27 1F   0628        BEQ   SCOP4
0581 A6 00   0629        LDA A X
0583 97 DB   0630        STA A SYMBOL+2
0585 08      0631        INX
0586 9C A3   0632        CPX   ENDSYM
0588 27 16   0633        BEQ   SCOP4
058A A6 00   0634        LDA A X
058C 97 DC   0635        STA A SYMBOL+3
058E 08      0636        INX
058F 9C A3   0637        CPX   ENDSYM
0591 27 0D   0638        BEQ   SCOP4
0593 A6 00   0639        LDA A X
0595 97 DD   0640        STA A SYMBOL+4
0597 08      0641        INX
0598 9C A3   0642        CPX   ENDSYM
059A 27 04   0643        BEQ   SCOP4
059C A6 00   0644        LDA A X
059E 97 DE   0645        STA A SYMBOL+5
05A0 32      0646 SCOP4  PUL A
05A1 DE B5   0647        LDX   XTEM1
05A3 39      0648        RTS
             0649 *
             0650 *****
             0651 *
05A4 DE F1   0652 SSRCH  LDX   TABSTA      SEARCH FOR SYMBOL
05A6 DF AF   0653        STX   BEFORE
05A8 CE 0000 0654        LDX   #0
05AB DF AB   0655        STX   CSYM
05AD DF AD   0656        STX   AFTER
05AF 9C C7   0657        CPX   LENT        ZERO LENGTH TABLE?
05B1 26 01   0658        BNE   SSR0        NO
05B3 39      0659        RTS               YES - NO SYMBOLS
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```
05B4 DE F1     0660 SSR0    LDX    TABSTA
05B6 A6 00     0661 SSR1    LDA A  0,X
05B8 27 0E     0662         BEQ    SSR6        NOTHING THERE - QUIT
05BA 91 D9     0663         CMP A  SYMBOL      CHECK FIRST CHAR
05BC 27 0D     0664         BEQ    SSR7        MATCH - TRY MORE CHARS
05BE 2E 05     0665         BGT    SSR4        MISMATCH - ALREADY PAST SYMBOL
05C0 BD 0655   0666 SSR3    JSR    FORWD       MISMATCH - NOT THERE YET
05C3 20 F1     0667         BRA    SSR1
05C5 DF AD     0668 SSR4    STX    AFTER
05C7 39        0669         RTS
05C8 DF AF     0670 SSR6    STX    BEFORE
05CA 39        0671         RTS
05CB DF AF     0672 SSR7    STX    BEFORE
05CD DF B5     0673         STX    XTEM1
05CF BD 06E8   0674         JSR    COMSYM      COMPARE ALL SIX CHARS
05D2 27 0F     0675         BEQ    SSR9        GOT IT!
05D4 2D 08     0676         BLT    SSR8        NOT FOUND; QUIT
05D6 DE B5     0677         LDX    XTEM1       NOT THERE YET
05D8 DF AF     0678         STX    BEFORE
05DA DE B7     0679         LDX    XTEM2
05DC 20 E2     0680         BRA    SSR3
05DE DE B5     0681 SSR8    LDX    XTEM1
05E0 DF AD     0682         STX    AFTER
05E2 39        0683         RTS
05E3 DE B5     0684 SSR9    LDX    XTEM1
05E5 DF AB     0685         STX    CSYM        SET 'CURRENT SYMBOL'
05E7 DE B7     0686         LDX    XTEM2
05E9 39        0687         RTS
               0688 *
               0689 *****
               0690 *
05EA 96 CA     0691 DIV     LDA A DDEND+1      DIVIDE ROUTINE - (A) = DDEND
05EC 36        0692         PSH A              (B) = DSOR
05ED 96 C9     0693         LDA A DDEND
05EF 36        0694         PSH A
05F0 D6 CC     0695         LDA B DSOR+1
05F2 96 CB     0696         LDA A DSOR
05F4 37        0697         PSH B
05F5 36        0698         PSH A
05F6 34        0699         DES                MAKE WORKSPACE
05F7 30        0700         TSX                POINT TO IT ALL
05F8 4F        0701         CLR A
05F9 4C        0702         INC A
05FA 6D 01     0703         TST    1,X         DIVISOR MSB
05FC 2B 0B     0704         BMI    DIV2
05FE 4C        0705 DIV1    INC A
05FF 68 02     0706         ASL    2,X
0601 69 01     0707         ROL    1,X
0603 2B 04     0708         BMI    DIV2
0605 81 11     0709         CMP A #$11
0607 26 F5     0710         BNE    DIV1
0609 A7 00     0711 DIV2    STA A 0,X
060B A6 03     0712         LDA A 3,X
060D E6 04     0713         LDA B 4,X
060F 6F 04     0714         CLR    4,X
0611 6F 03     0715         CLR    3,X
0613 E0 02     0716 DIV3    SUB B 2,X
0615 A2 01     0717         SBC A 1,X
0617 24 07     0718         BCC    DIV4        KEEP TRYING
0619 EB 02     0719         ADD B 2,X
```

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061B A9 01   0720        ADC A 1,X
061D 0C      0721        CLC
061E 20 01   0722        BRA   DIV5
0620 0D      0723 DIV4   SEC
0621 69 04   0724 DIV5   ROL   4,X
0623 69 03   0725        ROL   3,X
0625 64 01   0726        LSR   1,X
0627 66 02   0727        ROR   2,X
0629 6A 00   0728        DEC   X
062B 26 E6   0729        BNE   DIV3          NOT DONE
062D 97 CD   0730        STA A REM
062F D7 CE   0731        STA B REM+1
0631 31      0732        INS                 RESTORE STACK
0632 31      0733        INS
0633 31      0734        INS
0634 32      0735        PUL A               MSB OF QUOTIENT
0635 33      0736        PUL B               LSB
0636 39      0737        RTS
             0738 *
             0739 *****
             0740 *
0637 36      0741 BACKUP PSH A               BACK UP TO SYMBOL START
0638 08      0742        INX
0639 09      0743 BACK1  DEX
063A 9C F1   0744        CPX   TABSTA        TABLE START ADDR
063C 27 14   0745        BEQ   BACK2
063E A6 00   0746        LDA A 0,X           LOOK FOR $FF PRECEEDED BY ....
0640 81 FF   0747        CMP A #$FF
0642 26 F5   0748        BNE   BACK1
0644 09      0749        DEX
0645 9C F1   0750        CPX   TABSTA
0647 27 09   0751        BEQ   BACK2
0649 A1 00   0752        CMP A 0,X           ... ANOTHER $FF
064B 26 EC   0753        BNE   BACK1
064D 08      0754        INX
064E 08      0755        INX
064F 32      0756        PUL A
0650 0C      0757        CLC                 DID NOT REACH TABSTA
0651 39      0758        RTS
0652 32      0759 BACK2  PUL A
0653 0D      0760        SEC                 REACHED TABSTA
0654 39      0761        RTS
             0762 *
             0763 *****
             0764 *
0655 36      0765 FORWD  PSH A               ADVANCE TO START OF NEXT
0656 09      0766        DEX                 TABLE ENTRY
0657 08      0767 FOR1   INX
0658 9C EF   0768        CPX   TABEND        TABLE END
065A 27 18   0769        BEQ   FOR4
065C A6 00   0770        LDA A 0,X           LOOK FOR $FF FOLLOWED BY ...
065E 81 FF   0771        CMP A #$FF
0660 26 F5   0772        BNE   FOR1
0662 08      0773        INX
0663 9C EF   0774        CPX   TABEND
0665 27 0D   0775        BEQ   FOR4
0667 A1 00   0776        CMP A 0,X           ... ANOTHER $FF BYTE - AND THEN
0669 26 EC   0777        BNE   FOR1
066B 08      0778 FOR3   INX
066C 9C EF   0779        CPX   TABEND
```

```
066E 27 04    0780        BEQ   FOR4
0670 A1 00    0781        CMP A 0,X
0672 27 F7    0782        BEQ   FOR3        ... A NON-$FF BYTE
0674 32       0783 FOR4   PUL A
0675 39       0784        RTS
              0785 *
0676 7F 00A8  0786 OSRCH  CLR   MRI         OPCODE TABLE SEARCH
0679 D6 A4    0787        LDA B ENDSYM+1    CALCULATE LENGTH OF SYMBOL
067B D0 A6    0788        SUB B BEGSYM+1
067D D7 A7    0789 OSR1   STA B SYMLEN      SAVE LENGTH
067F 5A       0790        DEC B
0680 27 4C    0791        BEQ   OSR11       1 CHAR CODE
0682 5A       0792        DEC B
0683 27 32    0793        BEQ   OSR8
0685 5A       0794        DEC B
0686 27 30    0795        BEQ   OSR9        3 CHAR CODE
0688 5A       0796        DEC B
0689 26 2C    0797        BNE   OSR8
068B CE 0D49  0798        LDX   #ENDOP4+1   4 CHAR CODE
068E DF A9    0799        STX   OPCEND
0690 CE 0C54  0800        LDX   #OPCOD4
0693 DF B5    0801 OSR3   STX   XTEM1       TABLE PTR
0695 DE A5    0802        LDX   BEGSYM
0697 DF B7    0803        STX   XTEM2       SYMBOL PTR
0699 A6 00    0804 OSR4   LDA A 0,X         GET A SYMBOL CHAR
069B 9C A3    0805        CPX   ENDSYM
069D 27 10    0806        BEQ   OSR5        IF ALL CHARS MATCH - BRANCH
069F 08       0807        INX
06A0 DF B7    0808        STX   XTEM2
06A2 DE B5    0809        LDX   XTEM1
06A4 A1 00    0810        CMP A 0,X         COMPARE TO TABLE CHAR
06A6 26 1A    0811        BNE   OSR10
06A8 08       0812        INX
06A9 DF B5    0813        STX   XTEM1
06AB DE B7    0814        LDX   XTEM2
06AD 20 EA    0815        BRA   OSR4
06AF DE B5    0816 OSR5   LDX   XTEM1       FOUND IT - GET FLAGS
06B1 A6 00    0817        LDA A 0,X
06B3 8A 80    0818 OSR6   ORA A #$80        SET OPCODE FLAG
06B5 97 A8    0819        STA A MRI
06B7 39       0820 OSR8   RTS
06B8 CE 0C54  0821 OSR9   LDX   #ENDOP3+1
06BB DF A9    0822        STX   OPCEND
06BD CE 0AE4  0823        LDX   #OPCOD3
06C0 20 D1    0824        BRA   OSR3
06C2 A6 00    0825 OSR10  LDA A 0,X         FIND NEXT OPCODE
06C4 08       0826        INX
06C5 84 78    0827        AND A #$78
06C7 26 F9    0828        BNE   OSR10       NOT A FLAGS BYTE - ADVANCE
06C9 9C A9    0829        CPX   OPCEND
06CB 26 C6    0830        BNE   OSR3
06CD 39       0831        RTS
06CE DE A5    0832 OSR11  LDX   BEGSYM      WAS IT A,B OR X?
06D0 A6 00    0833        LDA A 0,X
06D2 81 41    0834        CMP A #'A
06D4 27 04    0835        BEQ   OSR12
06D6 81 42    0836        CMP A #'B
06D8 26 05    0837        BNE   OSR15
06DA 86 81    0838 OSR12  LDA A #$81        WAS A OR B
06DC 97 A8    0839        STA A MRI
```

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06DE 39       0840 OSR14  RTS
06DF 81 58    0841 OSR15  CMP A #'X
06E1 26 FB    0842        BNE   OSR14
06E3 86 80    0843        LDA A #$80          WAS X
06E5 97 A8    0844        STA A MRI
06E7 39       0845        RTS
              0846 *
              0847 *****
              0848 *
06E8 96 D9    0849 COMSYM LDA A SYMBOL        COMPARE SYM TO TABLE
06EA A1 00    0850        CMP A X             S-T
06EC 26 26    0851        BNE   CMS6
06EE 08       0852        INX
06EF 96 DA    0853        LDA A SYMBOL+1
06F1 A1 00    0854        CMP A X
06F3 26 1F    0855        BNE   CMS6
06F5 08       0856        INX
06F6 96 DB    0857        LDA A SYMBOL+2
06F8 A1 00    0858        CMP A X
06FA 26 18    0859        BNE   CMS6
06FC 08       0860        INX
06FD 96 DC    0861        LDA A SYMBOL+3
06FF A1 00    0862        CMP A X
0701 26 11    0863        BNE   CMS6
0703 08       0864        INX
0704 96 DD    0865        LDA A SYMBOL+4
0706 A1 00    0866        CMP A X
0708 26 0A    0867        BNE   CMS6
070A 08       0868        INX
070B 96 DE    0869        LDA A SYMBOL+5
070D A1 00    0870        CMP A X
070F 26 03    0871        BNE   CMS6
0711 08       0872        INX
0712 4F       0873        CLR A               SET Z FLAG
0713 39       0874        RTS
0714 07       0875 CMS6   TPA
0715 DF B7    0876        STX   XTEM2
0717 06       0877        TAP
0718 39       0878        RTS
              0879 *
              0880 *****
              0881 *
0719 DE F1    0882 ADDSYM LDX   TABSTA        ADD SYMBL TO TBL IN SORTED ORDER
071B A6 00    0883        LDA A 0,X           ANY ENTRIES?
071D 26 11    0884        BNE   ADS1          YES
071F BD 079B  0885 ADS9   JSR   MOV10B
0722 BD 076D  0886 ADS2   JSR   COPSYM        COPY SYMBOL TO TABLE
0725 6F 00    0887        CLR   X             MAKE SPACE FOR DEFINITION LINE #
0727 6F 01    0888        CLR   1,X
0729 86 FF    0889        LDA A #$FF
072B A7 02    0890        STA A 2,X           INSERT SEPARATOR CODE
072D A7 03    0891        STA A 3,X
072F 39       0892        RTS
0730 BD 07B9  0893 ADS1   JSR   FENDT         ENOUGH ROOM FOR IT?
0733 BD 07FD  0894        JSR   MEMREM
0736 26 09    0895        BNE   ADS3
0738 C0 0A    0896        SUB B #10           ROOM FOR 10 MORE?
073A 2A 05    0897        BPL   ADS3          YES - ADD TO TABLE
073C 31       0898        INS                 KILL RETURN ADDR
073D 31       0899        INS
```

```
073E 7E 02DC 0900         JMP   OVERF
0741 DE AD   0901 ADS3    LDX   AFTER
0743 26 12   0902         BNE   ADS8
0745 DE AF   0903         LDX   BEFORE
0747 9C F1   0904         CPX   TABSTA     AT BEGINNING?
0749 26 07   0905         BNE   ADS4
074B DF B5   0906         STX   XTEM1      YES
074D BD 06E8 0907         JSR   COMSYM     INSERT AT BEGINNING?
0750 2D 05   0908         BLT   ADS8       YES
0752 BD 0655 0909 ADS4    JSR   FORWD
0755 DF B5   0910         STX   XTEM1
0757 A6 00   0911 ADS8    LDA A 0,X        END OF TABLE?
0759 27 C4   0912         BEQ   ADS9       YES
075B BD 06E8 0913         JSR   COMSYM
075E 27 0C   0914         BEQ   ADS5       ERROR; ALREADY HERE
0760 2E F0   0915         BGT   ADS4       SYMBOL>TABLE
0762 BD 0637 0916         JSR   BACKUP
0765 DF B5   0917         STX   XTEM1
0767 BD 0790 0918         JSR   MOV10      MAKE SPACE HERE
076A 20 B6   0919         BRA   ADS2
076C 39      0920 ADS5    RTS
             0921 *
             0922 *****
             0923 *
076D 36      0924 COPSYM  PSH A            COPY SYMBOL TO TABLE FROM BUFFER
076E 96 D9   0925         LDA A SYMBOL
0770 A7 00   0926         STA A X
0772 08      0927         INX
0773 96 DA   0928         LDA A SYMBOL+1
0775 A7 00   0929         STA A X
0777 08      0930         INX
0778 96 DB   0931         LDA A SYMBOL+2
077A A7 00   0932         STA A X
077C 08      0933         INX
077D 96 DC   0934         LDA A SYMBOL+3
077F A7 00   0935         STA A X
0781 08      0936         INX
0782 96 DD   0937         LDA A SYMBOL+4
0784 A7 00   0938         STA A X
0786 08      0939         INX
0787 96 DE   0940         LDA A SYMBOL+5
0789 A7 00   0941         STA A X
078B 08      0942         INX
078C DF B5   0943         STX   XTEM1
078E 32      0944         PUL A
078F 39      0945         RTS
             0946 *
             0947 *****
             0948 *
0790 DE CF   0949 MOV10   LDX   TABEND     MAKE A 10 BYTE SPACE IN TABLE
0792 09      0950 MOV10A  DEX
0793 A6 00   0951         LDA A 0,X        MOVE IT 10 BYTES FORWARD UNTIL...
0795 A7 0A   0952         STA A 10,X
0797 9C B5   0953         CPX   XTEM1      ...XTEM1 IS REACHED; THEN STOP
0799 26 F7   0954         BNE   MOV10A
079B 96 C8   0955 MOV10B  LDA A LENT+1     UPDATE LENGTH
079D 8B 0A   0956         ADD A #10
079F 97 C8   0957         STA A LENT+1
07A1 24 03   0958         BCC   MOV10C
07A3 7C 00C7 0959         INC   LENT
```

```
07A6 20 11    0960 MOV10C BRA   FENDT
              0961 *
              0962 *****
              0963 *
07A8 08       0964 INSDF6 INX                INSERT DEFINITION AT
07A9 08       0965        INX                EXISTING ENTRY
07AA 08       0966        INX
07AB 08       0967        INX
07AC 08       0968        INX
07AD 08       0969        INX
07AE 36       0970 INSDEF PSH A              INSERT DEFINITION AT NEW ENTRY
07AF 96 BF    0971        LDA A LNUM
07B1 A7 00    0972        STA A 0,X
07B3 96 C0    0973        LDA A LNUM+1
07B5 A7 01    0974        STA A 1,X
07B7 32       0975        PUL A
07B8 39       0976        RTS
              0977 *
              0978 *****
              0979 *
07B9 96 F1    0980 FENDT  LDA A TABSTA       FIND END OF TABLE
07BB D6 F2    0981        LDA B TABSTA+1
07BD DB C8    0982        ADD B LENT+1
07BF 99 C7    0983        ADC A LENT
07C1 97 EF    0984        STA A TABEND
07C3 D7 F0    0985        STA B TABEND+1
07C5 39       0986        RTS
              0987 *
              0988 *****
              0989 *
07C6 DF B5    0990 ADDREF STX   XTEM1        ADD A REF TO TABLE
07C8 8D EF    0991        BSR   FENDT        CHECK MEMORY REMAINING
07CA 8D 31    0992        BSR   MEMREM
07CC 26 09    0993        BNE   ADRF1
07CE C0 02    0994        SUB B #2
07D0 2A 05    0995        BPL   ADRF1        ENOUGH LEFT
07D2 31       0996        INS                KILL RETURN ADDR
07D3 31       0997        INS
07D4 7E 02DC  0998        JMP   OVERF
07D7 DE B5    0999 ADRF1  LDX   XTEM1
07D9 BD 0655  1000        JSR   FORWD
07DC 09       1001        DEX                MAKE SPACE JUST BEFORE...
07DD 09       1002        DEX                ...NEXT SYMBOL
07DE DF B5    1003        STX   XTEM1
07E0 8D 03    1004        BSR   MOV2
07E2 7E 07AE  1005        JMP   INSDEF
              1006 *
              1007 *****
              1008 *
07E5 DE EF    1009 MOV2   LDX   TABEND       MAKE A 2 BYTE SPACE
07E7 09       1010 MOV21  DEX
07E8 A6 00    1011        LDA A 0,X
07EA A7 02    1012        STA A 2,X
07EC 9C B5    1013        CPX   XTEM1
07EE 26 F7    1014        BNE   MOV21
07F0 96 C8    1015        LDA A LENT+1       UPDATE LENGTH VARIABLE...
07F2 8B 02    1016        ADD A #2
07F4 97 C8    1017        STA A LENT+1
07F6 24 03    1018        BCC   MOV22
07F8 7C 00C7  1019        INC   LENT
```

```
07FB 20 BC     1020 MOV22  BRA    FENDT
               1021 *
               1022 *****
               1023 *
07FD 96 E5     1024 MEMREM LDA A MAXMEM       CALC UNUSED MEMORY SIZE
07FF D6 E6     1025        LDA B MAXMEM+1
0801 D0 F0     1026        SUB B TABEND+1
0803 92 EF     1027        SBC A TABEND
0805 CB 01     1028        ADD B #1
0807 89 00     1029        ADC A #0
0809 39        1030 MEMR1  RTS
               1031 *
080A 36        1032 SMASH  PSH A              COMPRESS OPCODE TO 4 CHARS
080B DE A5     1033        LDX    BEGSYM
080D 08        1034        INX
080E 08        1035        INX
080F 08        1036        INX
0810 A6 00     1037        LDA A 0,X
0812 08        1038        INX
0813 81 20     1039        CMP A #SPACE       IS 4TH CHAR A SPACE?
0815 27 02     1040        BEQ    SMA3        YES
0817 32        1041 SMA2   PUL A
0818 39        1042        RTS
0819 A6 00     1043 SMA3   LDA A 0,X          IS 5TH CHAR AN 'A' OR 'B'
081B 81 41     1044        CMP A #'A
081D 27 07     1045        BEQ    SMA6
081F 81 42     1046        CMP A #'B
0821 27 03     1047        BEQ    SMA6
0823 09        1048 SMA4   DEX
0824 20 F1     1049        BRA    SMA2
0826 A6 01     1050 SMA6   LDA A 1,X          YES
0828 81 20     1051        CMP A #$20         IS 6TH CHAR A SPACE?
082A 26 F7     1052        BNE    SMA4
082C DF B7     1053        STX    XTEM2       YES - SQUEEZE THE OPCODE
082E 09        1054        DEX
082F 09        1055        DEX
0830 08        1056 SMA7   INX
0831 9C F6     1057        CPX    LBUFE
0833 27 06     1058        BEQ    SMA9
0835 A6 01     1059        LDA A 1,X
0837 A7 00     1060        STA A 0,X
0839 20 F5     1061        BRA    SMA7
083B 09        1062 SMA9   DEX
083C 6F 00     1063        CLR    X
083E DE B7     1064        LDX    XTEM2
0840 20 D5     1065        BRA    SMA2
               1066 *
               1067 *****
               1068 *
0842 DF B7     1069 EPARSE STX    XTEM2       PARSE FOR EXPRESSION
0844 36        1070        PSH A
0845 A6 00     1071 EP1    LDA A 0,X          CAST OUT SPACES
0847 27 0B     1072        BEQ    EP3
0849 81 20     1073        CMP A #SPACE
084B 26 03     1074        BNE    EP2
084D 08        1075        INX
084E 20 F5     1076        BRA    EP1
0850 81 0D     1077 EP2    CMP A #$D          END OF LINE?
0852 26 02     1078        BNE    EP5         NO
0854 32        1079 EP3    PUL A
```

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0855 39        1080        RTS
0856 08        1081 EP5    INX             LOOK FOR CR,SP OR NULL
0857 A6 00     1082        LDA A 0,X
0859 81 0D     1083        CMP A #$D
085B 27 08     1084        BEQ   EP9
085D 81 20     1085        CMP A #SPACE
085F 22 F5     1086        BHI   EP5
0861 86 0D     1087 EP6    LDA A #$D       PUT CR INTO LBUF
0863 A7 00     1088        STA A 0,X
0865 4F        1089 EP9    CLR A
0866 08        1090 EP10   INX             CLEAR TO END OF LBUF
0867 9C F6     1091        CPX   LBUFE
0869 27 04     1092        BEQ   EP8
086B A7 00     1093        STA A X
086D 20 F7     1094        BRA   EP10
086F DE A3     1095 EP8    LDX   ENDSYM
0871 20 E1     1096        BRA   EP3
               1097 *
               1098 *****
               1099 *
0873 CE 0000   1100 PTABLE LDX   #0        PRINT THE TABLE
0876 DF A1     1101        STX   NSYM
0878 BD 0115   1102        JSR   INITIO
087B BD 0A4D   1103        JSR   WSPAC
087E 96 E0     1104        LDA A LCOUNT
0880 80 02     1105        SUB A #2
0882 97 D0     1106        STA A NLINE
0884 CE 01EE   1107        LDX   #CR2
0887 BD 098B   1108        JSR   PSTR
088A CE 0192   1109        LDX   #MES7     TITLE
088D BD 098B   1110        JSR   PSTR
0890 CE 01F0   1111        LDX   #CRS
0893 BD 098B   1112        JSR   PSTR
0896 CE 0154   1113        LDX   #MES3
0899 BD 098B   1114        JSR   PSTR
089C CE 01EC   1115        LDX   #CR3
089F BD 098B   1116        JSR   PSTR
08A2 CE 0168   1117        LDX   #MES5     COL. HEADINGS
08A5 BD 098B   1118        JSR   PSTR
08A8 BD 09E4   1119        JSR   NAMEIT
08AB CE 01C2   1120        LDX   #MES9
08AE BD 098B   1121        JSR   PSTR
08B1 DE F1     1122        LDX   TABSTA
08B3 DF B5     1123        STX   XTEM1
               1124 *
               1125 * START OF EACH LABEL PRINT
               1126 *
08B5 DE B5     1127 PT0    LDX   XTEM1
08B7 A6 00     1128        LDA A 0,X       EQUALS '0' IF DONE
08B9 26 16     1129        BNE   PT1
08BB CE 01EC   1130        LDX   #CR3
08BE BD 098B   1131        JSR   PSTR
08C1 CE 0182   1132        LDX   #MES6
08C4 BD 098B   1133        JSR   PSTR
08C7 96 A1     1134        LDA A NSYM
08C9 D6 A2     1135        LDA B NSYM+1
08CB BD 0946   1136        JSR   DECTYP
08CE 7E 09C8   1137        JMP   PAGEUP    FEED TO TOF
               1138 *
08D1 DF B5     1139 PT1    STX   XTEM1
```

```
08D3 CE 01F0 1140          LDX    #CRS
08D6 BD 098B 1141          JSR    PSTR
08D9 DE B5   1142          LDX    XTEM1         PRINT SYMBOL NAME
08DB E6 06   1143          LDA B 6,X            SAVE THE 7TH CHAR
08DD 86 04   1144          LDA A #4             'END OF STRING' FLAG
08DF A7 06   1145          STA A 6,X
08E1 BD 098B 1146          JSR    PSTR
08E4 E7 00   1147          STA B 0,X            RESTORE THE TABLE
08E6 86 20   1148          LDA A #SPACE
08E8 BD 0118 1149          JSR    IOOUT
08EB A6 00   1150          LDA A 0,X            PRINT DEF
08ED E6 01   1151          LDA B 1,X
08EF BD 0946 1152          JSR    DECTYP
08F2 DF B5   1153          STX    XTEM1
08F4 CE 01F3 1154          LDX    #SP4
08F7 BD 098B 1155          JSR    PSTR
08FA D6 D2   1156          LDA B LINLEN         SET-UP # OF COLUMNS
08FC D7 D1   1157          STA B COLS
08FE DE B5   1158          LDX    XTEM1
             1159 *
0900 08      1160 PT2      INX
0901 08      1161          INX
0902 A6 00   1162          LDA A 0,X            CHECK FOR END OF ENTRY
0904 E6 01   1163          LDA B 1,X
0906 81 FF   1164          CMP A #$FF
0908 26 0E   1165          BNE    PT5
090A 11      1166          CBA
090B 26 0B   1167          BNE    PT5
090D 08      1168          INX                  IS END - MOVE TO NEXT
090E 08      1169          INX
090F DF B5   1170          STX    XTEM1
0911 DE A1   1171          LDX    NSYM
0913 08      1172          INX
0914 DF A1   1173          STX    NSYM
0916 20 9D   1174          BRA    PT0
             1175 *
0918 BD 0946 1176 PT5      JSR    DECTYP        PRINT REFERENCE
091B 86 20   1177          LDA A #$20           SPACE
091D BD 0118 1178          JSR    IOOUT
0920 7A 00D1 1179          DEC    COLS          OUT OF ROOM ON PAGE ?
0923 26 DB   1180          BNE    PT2           NO - CONTINUE AT PT2
             1181 *
0925 DF B5   1182          STX    XTEM1
0927 A6 02   1183          LDA A 2,X            CHECK FOR END OF REFS
0929 E6 03   1184          LDA B 3,X
092B 81 FF   1185          CMP A #$FF
092D 26 03   1186          BNE    PT6           NOT THE END
092F 11      1187          CBA
0930 27 0C   1188          BEQ    PT7           THE END - SKIP THE CR & SPACES
             1189 *
0932 CE 01F0 1190 PT6      LDX    #CRS
0935 BD 098B 1191          JSR    PSTR
0938 CE 01F6 1192          LDX    #S15
093B BD 098B 1193          JSR    PSTR
             1194 *
093E D6 D2   1195 PT7      LDA B LINLEN
0940 D7 D1   1196          STA B COLS
0942 DE B5   1197          LDX    XTEM1
0944 20 BA   1198          BRA    PT2
             1199 *
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                 1200 * TYPE A BYTE PAIR IN DECIMAL - ENTER
                 1201 * WITH NUMBER IN A,B - (MSB,LSB)
                 1202 *
0946 DF B7       1203 DECTYP STX   XTEM2
0948 97 C9       1204        STA A DDEND
094A D7 CA       1205        STA B DDEND+1
094C CE 000A     1206        LDX   #10
094F DF CB       1207        STX   DSOR
0951 CE 00D8     1208        LDX   #DECNOE     START AT LS DIGIT
0954 DF B9       1209        STX   XTEM3
0956 BD 05EA     1210 DCT1   JSR   DIV
0959 97 C9       1211        STA A DDEND
095B D7 CA       1212        STA B DDEND+1
095D D6 CE       1213        LDA B REM+1
095F DE B9       1214        LDX   XTEM3
0961 09          1215        DEX
0962 CB 30       1216        ADD B #'0       MAKE INTO ASCII
0964 E7 00       1217        STA B 0,X
0966 DF B9       1218        STX   XTEM3
0968 8C 00D3     1219        CPX   #DECNO      DONE?
096B 26 E9       1220        BNE   DCT1        NO
096D BD 0976     1221        JSR   KILLZ       SUPPRESS LEADING ZEROES
0970 BD 098B     1222        JSR   PSTR        PRINT IT
0973 DE B7       1223        LDX   XTEM2
0975 39          1224        RTS
                 1225 *
                 1226 *****
                 1227 *
0976 DF B9       1228 KILLZ  STX   XTEM3       SUPPRESS LEADING ZEROES
0978 A6 00       1229 KZ2    LDA A 0,X
097A 81 30       1230        CMP A #'0
097C 26 0A       1231        BNE   KZ4
097E 86 20       1232        LDA A #$20        WAS A ZERO
0980 A7 00       1233        STA A 0,X
0982 08          1234        INX
0983 8C 00D8     1235        CPX   #DECNOE
0986 26 F0       1236        BNE   KZ2
0988 DE B9       1237 KZ4    LDX   XTEM3
098A 39          1238        RTS
                 1239 *
                 1240 * PRINT A STRING ON OUTPUT DEVICE
                 1241 *
098B 37          1242 PSTR   PSH B
098C 36          1243        PSH A
098D A6 00       1244 PSTR2  LDA A 0,X
098F 81 04       1245        CMP A #4          END OF STRING?
0991 26 03       1246        BNE   PSTR4       NO
0993 32          1247        PUL A
0994 33          1248        PUL B
0995 39          1249        RTS
0996 8D 03       1250 PSTR4  BSR   PCHAR
0998 08          1251        INX
0999 20 F2       1252        BRA   PSTR2
                 1253 *
                 1254 * PRINT A CHAR AND CHECK FOR END OF PAGE
                 1255 *
099B BD 0118     1256 PCHAR  JSR   IOOUT
099E 81 0D       1257        CMP A #$D
09A0 27 01       1258        BEQ   PCH4
09A2 39          1259 PCH2   RTS
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                 1260 *
09A3 7D 00F3 1261 PCH4   TST    PGON          PAGINATION ON?
09A6 27 FA   1262        BEQ    PCH2          NO
09A8 7A 00D0 1263        DEC    NLINE         END OF PAGE?
09AB 26 F5   1264        BNE    PCH2          NO
09AD 96 E0   1265        LDA A  LCOUNT
09AF 97 D0   1266        STA A  NLINE
09B1 DF A9   1267        STX    OPCEND        TEMP SAVE
09B3 CE 0205 1268        LDX    #EOP
09B6 8D D3   1269        BSR    PSTR
09B8 CE 0168 1270        LDX    #MES5
09BB 8D CE   1271        BSR    PSTR
09BD BD 09E4 1272        JSR    NAMEIT        PRINT FILE NAME
09C0 CE 01C2 1273        LDX    #MES9
09C3 8D C6   1274        BSR    PSTR
09C5 DE A9   1275        LDX    OPCEND
09C7 39      1276        RTS
             1277 *
             1278 * FEED PAGE TO TOF
             1279 *
09C8 7D 00F3 1280 PAGEUP TST    PGON
09CB 27 16   1281        BEQ    PAGE9         NO PAGINATION
09CD D6 D0   1282        LDA B  NLINE         GET LINES REMAINING
09CF CB 02   1283        ADD B  #2
09D1 CE 01F0 1284 PAGE1  LDX    #CRS
09D4 A6 00   1285 PAGE2  LDA A  X
09D6 81 04   1286        CMP A  #4
09D8 27 06   1287        BEQ    PAGE3
09DA BD 0118 1288        JSR    IOOUT
09DD 08      1289        INX
09DE 20 F4   1290        BRA    PAGE2
09E0 5A      1291 PAGE3  DEC B
09E1 26 EE   1292        BNE    PAGE1
09E3 39      1293 PAGE9  RTS
             1294 *
             1295 * PRINT FILE NAME IN HEADER LINE
             1296 *
09E4 D6 CF   1297 NAMEIT LDA B  NSPAC
09E6 86 20   1298        LDA A  #SPACE
09E8 BD 099B 1299 NAME2  JSR    PCHAR         SPACE OVER TO RIGHT EDGE
09EB 5A      1300        DEC B
09EC 26 FA   1301        BNE    NAME2
09EE CE 01DE 1302        LDX    #MES10        "FILE NAME"
09F1 BD 098B 1303        JSR    PSTR
09F4 CE 0DD5 1304        LDX    #FNBUF
09F7 BD 098B 1305        JSR    PSTR          PRINT THE NAME
09FA CE 01F0 1306        LDX    #CRS
09FD 7E 098B 1307        JMP    PSTR
             1308 *
             1309 * FILE OPENED OK; ANNOUNCE IT
             1310 *
0A00 CE 01DE 1311 FOPEN  LDX    #MES10        "FILE NAME"
0A03 BD 0455 1312        JSR    TELOP
0A06 CE 0DD5 1313        LDX    #FNBUF
0A09 BD 0455 1314        JSR    TELOP
0A0C CE 01F0 1315        LDX    #CRS
0A0F BD 0455 1316        JSR    TELOP
0A12 39      1317        RTS
             1318 *
             1319 * COPY FILE NAME TO FNBUF
             1320 *
0A13 DE F8   1321 FNAME  LDX    RFCBP
0A15 08      1322        INX
0A16 08      1323        INX
0A17 08      1324        INX
0A18 DF BD   1325        STX    SX
0A1A C6 06   1326        LDA B #6          CHARS IN FN
0A1C CE 0DD5 1327        LDX    #FNBUF
0A1F DF BB   1328        STX    DX
0A21 8D 14   1329 FNAM1  BSR    CSTR       COPY THE STRING
0A23 86 2E   1330        LDA A #'.
0A25 DE BB   1331        LDX    DX
0A27 A7 00   1332        STA A X
0A29 08      1333        INX
0A2A DF BB   1334        STX    DX
0A2C C6 03   1335        LDA B #3
0A2E 8D 07   1336        BSR    CSTR
0A30 86 04   1337        LDA A #4
0A32 DE BB   1338        LDX    DX
0A34 A7 00   1339        STA A X           TERMINATE THE STRING
0A36 39      1340        RTS
             1341 *
             1342 * COPY FROM (SX) TO (DX) FOR (B)
             1343 *
0A37 DE BD   1344 CSTR   LDX    SX
0A39 A6 00   1345        LDA A X
0A3B 26 02   1346        BNE    CSTR1
0A3D 86 20   1347        LDA A #SPACE      REPLACE NULL WITH SP
0A3F 08      1348 CSTR1  INX
0A40 DF BD   1349        STX    SX
0A42 DE BB   1350        LDX    DX
0A44 A7 00   1351        STA A X
0A46 08      1352        INX
0A47 DF BB   1353        STX    DX
0A49 5A      1354        DEC B
0A4A 26 EB   1355        BNE    CSTR
0A4C 39      1356        RTS
             1357 *
             1358 * CALC # SPACES BEFORE FILE NAME
             1359 *
0A4D D6 D2   1360 WSPAC  LDA B LINLEN
0A4F 17      1361        TBA               MULT BY 6
0A50 58      1362        ASL B
0A51 1B      1363        ABA
0A52 48      1364        ASL A
0A53 80 21   1365        SUB A #33
0A55 2E 02   1366        BGT    WSP1       WIDE ENOUGH?
0A57 86 01   1367        LDA A #1          NO, USE 1 SPACE
0A59 97 CF   1368 WSP1   STA A NSPAC
0A5B 39      1369        RTS
             1370 *
             1371 *****
             1372 *
0A5C DE F1   1373 PURGE  LDX    TABSTA     PURGE DEFINED REFS
0A5E 08      1374 PUR1   INX
0A5F 08      1375        INX
0A60 08      1376        INX
0A61 08      1377        INX
0A62 08      1378        INX
0A63 08      1379        INX
```

```
0A64 6D 00   1380          TST    X             DOES DEFINITION EXIST?
0A66 26 2A   1381          BNE    PUR10         YES
0A68 6D 01   1382          TST    1,X           MAYBE
0A6A 26 26   1383          BNE    PUR10         YES
0A6C 08      1384          INX                  NO - KEEP THE REFS
0A6D 08      1385          INX
0A6E 6D 02   1386 PUR2     TST    2,X
0A70 26 05   1387          BNE    PUR6
0A72 6D 03   1388          TST    3,X
0A74 26 01   1389          BNE    PUR6
0A76 39      1390 PUR4     RTS
0A77 A6 00   1391 PUR6     LDA A  0,X
0A79 81 FF   1392          CMP A  #$FF
0A7B 27 07   1393          BEQ    PUR8
0A7D 9C E5   1394          CPX    MAXMEM
0A7F 27 F5   1395          BEQ    PUR4
0A81 08      1396          INX
0A82 20 F3   1397          BRA    PUR6
0A84 08      1398 PUR8     INX
0A85 9C E5   1399          CPX    MAXMEM
0A87 27 ED   1400          BEQ    PUR4
0A89 A6 00   1401          LDA A  0,X
0A8B 08      1402          INX
0A8C 81 FF   1403          CMP A  #$FF
0A8E 26 E7   1404          BNE    PUR6
0A90 20 CC   1405          BRA    PUR1
0A92 08      1406 PUR10    INX
0A93 08      1407          INX
0A94 A6 00   1408 PUR12    LDA A  0,X
0A96 81 FF   1409          CMP A  #$FF
0A98 26 06   1410          BNE    PUR14
0A9A A6 01   1411          LDA A  1,X
0A9C 81 FF   1412          CMP A  #$FF
0A9E 27 CE   1413          BEQ    PUR2
0AA0 DF B7   1414 PUR14    STX    XTEM2
0AA2 BD 07B9 1415          JSR    FENDT
0AA5 DE EF   1416          LDX    TABEND
0AA7 09      1417          DEX
0AA8 09      1418          DEX
0AA9 DF B9   1419          STX    XTEM3
0AAB DE B7   1420          LDX    XTEM2
0AAD A6 02   1421 PUR16    LDA A  2,X
0AAF A7 00   1422          STA A  0,X
0AB1 08      1423          INX
0AB2 9C B9   1424          CPX    XTEM3
0AB4 26 F7   1425          BNE    PUR16
0AB6 6F 00   1426          CLR    X
0AB8 6F 01   1427          CLR    1,X
0ABA DE C7   1428          LDX    LENT
0ABC 09      1429          DEX
0ABD 09      1430          DEX
0ABE DF C7   1431          STX    LENT
0AC0 DE B7   1432          LDX    XTEM2
0AC2 20 D0   1433          BRA    PUR12
             1434 *
             1435 *****
             1436 *
0AC4 36      1437 FLB      PSH A                FIND LAST BYTE USED IN TABLE
0AC5 DE E5   1438          LDX    MAXMEM
0AC7 86 FF   1439          LDA A  #$FF
```

```
0AC9 08       1440        INX
0ACA 09       1441 FL2    DEX
0ACB A1 00    1442        CMP A 0,X
0ACD 27 04    1443        BEQ   FL4
0ACF 9C F1    1444        CPX   TABSTA
0AD1 26 F7    1445        BNE   FL2
0AD3 08       1446 FL4    INX
0AD4 DF EF    1447        STX   TABEND
0AD6 96 F0    1448        LDA A TABEND+1
0AD8 90 F2    1449        SUB A TABSTA+1
0ADA 97 C8    1450        STA A LENT+1
0ADC 96 EF    1451        LDA A TABEND
0ADE 92 F1    1452        SBC A TABSTA
0AE0 97 C7    1453        STA A LENT
0AE2 32       1454        PUL A
0AE3 39       1455        RTS
              1456 *
              1457 * OPCODE TABLES
              1458 *
0001          1459 MR     EQU   1             MEM REF
0002          1460 AR     EQU   2             AC REF
0003          1461 AMR    EQU   3             AC & MEM REF
              1462 *
0AE4 4C       1463 OPCOD3 FCC   /LDA/
0AE7 03       1464        FCB   AMR
0AE8 53       1465        FCC   /STA/
0AEB 03       1466        FCB   AMR
0AEC 4C       1467        FCC   /LDX/
0AEF 01       1468        FCB   MR
0AF0 53       1469        FCC   /STX/
0AF3 01       1470        FCB   MR
0AF4 49       1471        FCC   /INX/
0AF7 00       1472        FCB   0
0AF8 44       1473        FCC   /DEX/
0AFB 00       1474        FCB   0
0AFC 49       1475        FCC   /INC/
0AFF 03       1476        FCB   AMR
0B00 44       1477        FCC   /DEC/
0B03 03       1478        FCB   AMR
0B04 4A       1479        FCC   /JMP/
0B07 01       1480        FCB   MR
0B08 4A       1481        FCC   /JSR/
0B0B 01       1482        FCB   MR
0B0C 52       1483        FCC   /RTS/
0B0F 00       1484        FCB   0
0B10 50       1485        FCC   /PSH/
0B13 00       1486        FCB   0
0B14 50       1487        FCC   /PUL/
0B17 00       1488        FCB   0
0B18 54       1489        FCC   /TST/
0B1B 03       1490        FCB   AMR
0B1C 42       1491        FCC   /BSR/
0B1F 01       1492        FCB   MR
0B20 42       1493        FCC   /BRA/
0B23 01       1494        FCB   MR
0B24 42       1495        FCC   /BMI/
0B27 01       1496        FCB   MR
0B28 42       1497        FCC   /BPL/
0B2B 01       1498        FCB   MR
0B2C 42       1499        FCC   /BNE/
```

```
0B2F 01         1500          FCB   MR
0B30 42         1501          FCC   /BIT/
0B33 03         1502          FCB   AMR
0B34 42         1503          FCC   /BEQ/
0B37 01         1504          FCB   MR
0B38 42         1505          FCC   /BCC/
0B3B 01         1506          FCB   MR
0B3C 42         1507          FCC   /BHS/
0B3F 01         1508          FCB   MR
0B40 42         1509          FCC   /BLO/
0B43 01         1510          FCB   MR
0B44 42         1511          FCC   /BCS/
0B47 01         1512          FCB   MR
0B48 42         1513          FCC   /BGE/
0B4B 01         1514          FCB   MR
0B4C 42         1515          FCC   /BGT/
0B4F 01         1516          FCB   MR
0B50 42         1517          FCC   /BHI/
0B53 01         1518          FCB   MR
0B54 42         1519          FCC   /BLE/
0B57 01         1520          FCB   MR
0B58 42         1521          FCC   /BLS/
0B5B 01         1522          FCB   MR
0B5C 42         1523          FCC   /BLT/
0B5F 01         1524          FCB   MR
0B60 42         1525          FCC   /BVC/
0B63 01         1526          FCB   MR
0B64 42         1527          FCC   /BVS/
0B67 01         1528          FCB   MR
0B68 43         1529          FCC   /CLR/
0B6B 03         1530          FCB   AMR
0B6C 43         1531          FCC   /CMP/
0B6F 03         1532          FCB   AMR
0B70 43         1533          FCC   /CPX/
0B73 01         1534          FCB   MR
0B74 43         1535          FCC   /COM/
0B77 03         1536          FCB   AMR
0B78 44         1537          FCC   /DES/
0B7B 00         1538          FCB   0
0B7C 49         1539          FCC   /INS/
0B7F 00         1540          FCB   0
0B80 4E         1541          FCC   /NEG/
0B83 03         1542          FCB   AMR
0B84 4E         1543          FCC   /NOP/
0B87 00         1544          FCB   0
0B88 53         1545          FCC   /SEI/
0B8B 00         1546          FCB   0
0B8C 43         1547          FCC   /CLI/
0B8F 00         1548          FCB   0
0B90 53         1549          FCC   /STS/
0B93 01         1550          FCB   MR
0B94 53         1551          FCC   /SWI/
0B97 00         1552          FCB   0
0B98 54         1553          FCC   /TAB/
0B9B 00         1554          FCB   0
0B9C 54         1555          FCC   /TBA/
0B9F 00         1556          FCB   0
0BA0 54         1557          FCC   /TSX/
0BA3 00         1558          FCB   0
0BA4 41         1559          FCC   /ADD/
```

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0BA7 03       1560       FCB   AMR
0BA8 41       1561       FCC   /ADC/
0BAB 03       1562       FCB   AMR
0BAC 53       1563       FCC   /SUB/
0BAF 03       1564       FCB   AMR
0BB0 53       1565       FCC   /SBC/
0BB3 03       1566       FCB   AMR
0BB4 41       1567       FCC   /AND/
0BB7 03       1568       FCB   AMR
0BB8 41       1569       FCC   /ABA/
0BBB 00       1570       FCB   0
0BBC 41       1571       FCC   /ASL/
0BBF 03       1572       FCB   AMR
0BC0 41       1573       FCC   /ASR/
0BC3 03       1574       FCB   AMR
0BC4 43       1575       FCC   /CBA/
0BC7 00       1576       FCB   0
0BC8 45       1577       FCC   /EOR/
0BCB 03       1578       FCB   AMR
0BCC 4C       1579       FCC   /LSR/
0BCF 03       1580       FCB   AMR
0BD0 4F       1581       FCC   /ORA/
0BD3 03       1582       FCB   AMR
0BD4 52       1583       FCC   /ROL/
0BD7 03       1584       FCB   AMR
0BD8 52       1585       FCC   /ROR/
0BDB 03       1586       FCB   AMR
0BDC 53       1587       FCC   /SBA/
0BDF 00       1588       FCB   0
0BE0 4C       1589       FCC   /LDS/
0BE3 01       1590       FCB   MR
0BE4 53       1591       FCC   /STS/
0BE7 01       1592       FCB   MR
0BE8 54       1593       FCC   /TAP/
0BEB 00       1594       FCB   0
0BEC 54       1595       FCC   /TPA/
0BEF 00       1596       FCB   0
0BF0 54       1597       FCC   /TXS/
0BF3 00       1598       FCB   0
0BF4 43       1599       FCC   /CLC/
0BF7 00       1600       FCB   0
0BF8 53       1601       FCC   /SEC/
0BFB 00       1602       FCB   0
0BFC 43       1603       FCC   /CLI/
0BFF 00       1604       FCB   0
0C00 43       1605       FCC   /CLV/
0C03 00       1606       FCB   0
0C04 53       1607       FCC   /SEI/
0C07 00       1608       FCB   0
0C08 53       1609       FCC   /SEV/
0C0B 00       1610       FCB   0
0C0C 53       1611       FCC   /SWI/
0C0F 00       1612       FCB   0
0C10 57       1613       FCC   /WAI/
0C13 00       1614       FCB   0
0C14 44       1615       FCC   /DAA/
0C17 00       1616       FCB   0
0C18 52       1617       FCC   /RTI/
              1618 *
0C1B 00       1619       FCB   0
```

```
0C1C 45        1620         FCC   /END/
0C1F 00        1621         FCB   0
0C20 45        1622         FCC   /EQU/
0C23 01        1623         FCB   MR
0C24 46        1624         FCC   /FCB/
0C27 01        1625         FCB   MR
0C28 46        1626         FCC   /FCC/
0C2B 00        1627         FCB   0
0C2C 46        1628         FCC   /FDB/
0C2F 01        1629         FCB   MR
0C30 4D        1630         FCC   /MON/
0C33 00        1631         FCB   0
0C34 4E        1632         FCC   /NAM/
0C37 00        1633         FCB   0
0C38 4F        1634         FCC   /OPT/
0C3B 00        1635         FCB   0
0C3C 4C        1636         FCC   /LNC/
0C3F 00        1637         FCB   0
0C40 54        1638         FCC   /TTL/
0C43 00        1639         FCB   0
0C44 4F        1640         FCC   /ORG/
0C47 01        1641         FCB   MR
0C48 50        1642         FCC   /PAG/
0C4B 00        1643         FCB   0
0C4C 52        1644         FCC   /RMB/
0C4F 01        1645         FCB   MR
0C50 53        1646         FCC   /SPC/
0C53 01        1647 ENDOP3  FCB   MR
               1648 *
0C54 4C        1649 OPCOD4  FCC   /LDAA/
0C58 03        1650         FCB   AMR
0C59 4C        1651         FCC   /LDAB/
0C5D 03        1652         FCB   AMR
0C5E 53        1653         FCC   /STAA/
0C62 03        1654         FCB   AMR
0C63 53        1655         FCC   /STAB/
0C67 03        1656         FCB   AMR
0C68 49        1657         FCC   /INCA/
0C6C 02        1658         FCB   AR
0C6D 49        1659         FCC   /INCB/
0C71 02        1660         FCB   AR
0C72 44        1661         FCC   /DECA/
0C76 02        1662         FCB   AR
0C77 44        1663         FCC   /DECB/
0C7B 02        1664         FCB   AR
0C7C 50        1665         FCC   /PSHA/
0C80 02        1666         FCB   AR
0C81 50        1667         FCC   /PSHB/
0C85 02        1668         FCB   AR
0C86 50        1669         FCC   /PULA/
0C8A 02        1670         FCB   AR
0C8B 50        1671         FCC   /PULB/
0C8F 02        1672         FCB   AR
0C90 54        1673         FCC   /TSTA/
0C94 02        1674         FCB   AR
0C95 54        1675         FCC   /TSTB/
0C99 02        1676         FCB   AR
0C9A 42        1677         FCC   /BITA/
0C9E 03        1678         FCB   AMR
0C9F 42        1679         FCC   /BITB/
```

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0CA3 03         1680         FCB    AMR
0CA4 43         1681         FCC    /CLRA/
0CA8 02         1682         FCB    AR
0CA9 43         1683         FCC    /CLRB/
0CAD 02         1684         FCB    AR
0CAE 43         1685         FCC    /CMPA/
0CB2 03         1686         FCB    AMR
0CB3 43         1687         FCC    /CMPB/
0CB7 03         1688         FCB    AMR
0CB8 43         1689         FCC    /COMA/
0CBC 02         1690         FCB    AR
0CBD 43         1691         FCC    /COMB/
0CC1 02         1692         FCB    AR
0CC2 4E         1693         FCC    /NEGA/
0CC6 02         1694         FCB    AR
0CC7 4E         1695         FCC    /NEGB/
0CCB 02         1696         FCB    AR
0CCC 41         1697         FCC    /ADDA/
0CD0 03         1698         FCB    AMR
0CD1 41         1699         FCC    /ADDB/
0CD5 03         1700         FCB    AMR
0CD6 41         1701         FCC    /ADCA/
0CDA 03         1702         FCB    AMR
0CDB 41         1703         FCC    /ADCB/
0CDF 03         1704         FCB    AMR
0CE0 53         1705         FCC    /SUBA/
0CE4 03         1706         FCB    AMR
0CE5 53         1707         FCC    /SUBB/
0CE9 03         1708         FCB    AMR
0CEA 53         1709         FCC    /SBCA/
0CEE 03         1710         FCB    AMR
0CEF 53         1711         FCC    /SBCB/
0CF3 03         1712         FCB    AMR
0CF4 41         1713         FCC    /ANDA/
0CF8 03         1714         FCB    AMR
0CF9 41         1715         FCC    /ANDB/
0CFD 03         1716         FCB    AMR
0CFE 41         1717         FCC    /ASLA/
0D02 02         1718         FCB    AR
0D03 41         1719         FCC    /ASLB/
0D07 02         1720         FCB    AR
0D08 41         1721         FCC    /ASRA/
0D0C 02         1722         FCB    AR
0D0D 41         1723         FCC    /ASRB/
0D11 02         1724         FCB    AR
0D12 45         1725         FCC    /EORA/
0D16 03         1726         FCB    AMR
0D17 45         1727         FCC    /EORB/
0D1B 03         1728         FCB    AMR
0D1C 4C         1729         FCC    /LSRA/
0D20 02         1730         FCB    AR
0D21 4C         1731         FCC    /LSRB/
0D25 02         1732         FCB    AR
0D26 4F         1733         FCC    /ORAA/
0D2A 03         1734         FCB    AMR
0D2B 4F         1735         FCC    /ORAB/
0D2F 03         1736         FCB    AMR
0D30 52         1737         FCC    /ROLA/
0D34 02         1738         FCB    AR
0D35 52         1739         FCC    /ROLB/
```

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0D39 02        1740         FCB   AR
0D3A 52        1741         FCC   /RORA/
0D3E 02        1742         FCB   AR
0D3F 50        1743         FCC   /PAGE/
0D43 00        1744         FCB   0
0D44 52        1745         FCC   /RORB/
0D48 02        1746 ENDOP4 FCB   AR
               1747 *
               1748 *END OF ROMABLE CODE
               1749 *
               1750 * BUFFERS
               1751 *
               1752 * MUST USE RAM FROM HERE TO MAXMEM
               1753 *
0D49           1754         ORG   ENDOP4+1
               1755 *
0D49           1756 LBUFZ  RMB   140         LINE BUFFER
0DD5           1757 LBUFEZ EQU   *
               1758 *
               1759 * FILE NAME BUFFER
               1760 *
0DD5           1761 FNBUF  RMB   12
               1762 *
               1763 * DISK BUFFER
               1764 *
0DE1           1765 RFCB   RMB   166
               1766 *
0E87           1767 BEGT   EQU   *           BEGIN TABLE HERE
0100           1768         END   START
    NO ERROR(S) DETECTED
```